

adopted Professor Köppen's suggestion that the ascensions take place at the hour when the ordinary observations for telegraphic interchange are made in the morning. Teisserenc de Bort, as the result of eighteen years of balloon work, states that about 4 per cent of the sounding balloons are lost, but that many times they are found, after many months, with the records in usable condition. Attention is called to the importance of special observations of clouds by experienced observers whenever balloon ascensions are made.

The committee unanimously expressed the opinion that the continuation of the publication in full of the international observations in the free air is of the greatest importance and is absolutely necessary in the progress of scientific meteorology, and requested all nations to heartily support this work, which has hitherto been supported by the German Government only, but whose cost should be defrayed by all conjointly. The Russian Government has undertaken to communicate through diplomatic channels the plan of cooperation that was devised, and will also request active cooperation in balloon work.

With regard to kite work on the oceans, the committee resolved that this had a very special interest for meteorology, and requested that individual governments should consider the propriety of furnishing apparatus and instructed experts so that regular kite ascensions might be carried out on the steamers of all lines that are subsidized by the respective governments. It is requested that meteorological institutes and scientific societies should bring this idea to the attention of all steamship companies and enlist their cooperation in this new field of work.

A modification of the kite was exhibited to the committee; namely the Kufnetzof semicylindrical kite; these kites are remarkably small and light and therefore exert a slight pull on the kite line, seldom exceeding five kilograms; consequently the weight of the cable and the strength of the reel may be correspondingly diminished. This kite was first used in Pavlosk, where it has made many high ascensions. The kite meteorograph devised by Kufnetzof is not attached to the kite, but hangs from the kite line, below it, and by means of a wedge-shaped jacket the anemometer of the self-register is made to stand vertical and quiet.

Teisserenc de Bort, while continuing to use his paper balloons, has also turned his attention to the elastic india-rubber balloons, for which he has made a new, very light meteorograph, using a bimetallic thermometer very well ventilated. Doctor Shaw, of England, exhibited a peculiar, cheap kite meteorograph devised by Dines. Professor Hergesell exhibited three different meteorographs: 1st, a light instrument for kites; 2d, the ordinary model for rubber balloons; 3d, a new instrument for manned balloons, having an electrically ventilated aspiration thermometer. The newest forms of Hergesell-Bosch self-registers have clocks made in Switzerland of nickel steel which continue to go even in the lowest temperatures.

Of the greatest importance for the accurate measurement of pressures is the principle theoretically announced by Rosenthal in his memoir on the elastic reaction of aneroids during balloon ascensions and confirmed by the experimental work done at Strasburg by Professor Hergesell, i. e., that the compensation depends entirely upon the external pressure, so that the method hitherto used to compensate aneroids against the influence of temperature under high pressures that prevail at the earth's surface introduces an error of compensation that may be equivalent to 2000 meters at the greatest heights attained by balloons. It will be very important to properly consider these investigations in studying the international simultaneous ascensions.

It is not recommended that any one form of self-register shall be adopted in general but that each be fully described and investigated when it is used. Most of the instruments now in use have some value, but all are open to further im-

provements. The Hergesell tube thermometer is undoubtedly the most sensitive, but is delicate and needs careful handling. The various bimetallic thermometers are sufficiently sensitive to allow of comparison with the tube thermometer, since the accidental error is of almost the same magnitude as the difference in sensitiveness. The important points are the calibrating and handling of the instruments, the proper consideration of the aneroid compensation, and the critically accurate reduction of the curves of the self-register.

The next conference on aerial work will be held in Rome, probably in 1906, and only members of the committee will be invited. At the recent meeting numerous outsiders were present and took part in the discussions, but the official delegates represented Germany, England, France, Italy, Russia, Sweden, and Spain. Austria-Hungary and Switzerland were represented by unofficial delegates.—C. A.

#### THE METEOROLOGIA GENERALE DI LUIGI DE MARCHI.

The author of this book is the well known professor of physical geography and meteorology at the University of Padua, the scene of Galileo's lectures which laid the foundation for modern experimental science. Besides a number of scientific memoirs, Marchi has written several popular works on climatology and meteorology. His personal studies have been in the direction of the elucidation of the dynamics of the atmosphere and the work we have in hand is the second, much enlarged, edition of a former treatise elucidating this subject; it is simply a short treatise on physical meteorology, which, as he says, has undergone a radical transformation in the past twenty years. The composition of the air, the laws for the transformation of aqueous vapor, the static and dynamic condition of a vertical column of the atmosphere are now looked upon from a different standpoint; the theories of meteorological apparatus have now become more precise; the meteorological importance of atmospheric electricity has become better defined and meteorology in general has come to occupy a higher position as a natural philosophy. A booklet of 225 pages, 16-mo, can, of course, give only a brief account of the more prominent features of our present knowledge of meteorology, but the author has apparently selected wisely and the Italian reader will certainly find this manual, which belongs to the series published by Ulrico Hoepli of Milan, leading him in the right direction and preparing him for the more critical study of advanced treatises and special memoirs.

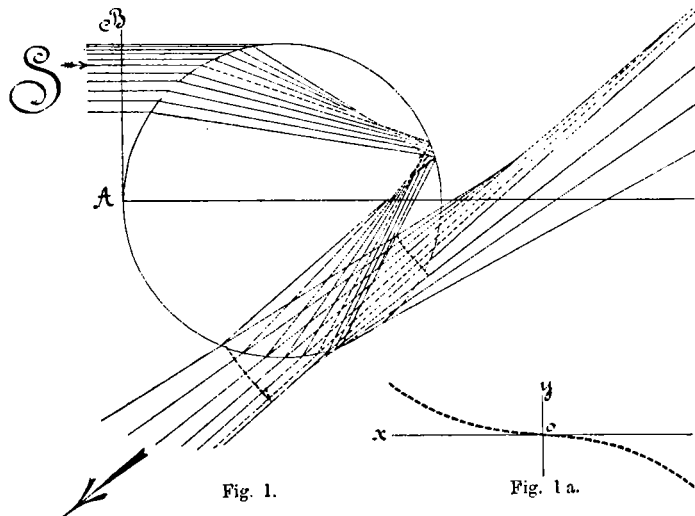
The volume is divided into four sections and subdivided into seventeen chapters. The first section, on the atmosphere, considers the physical properties of the air and the structure of the atmosphere, the action of aqueous vapor and of atmospheric electricity. The second section relates to equilibrium and motion, barometric pressure, the laws of motion both horizontal and vertical, and the conditions of equilibrium. The third section deals with the temperature of the air, its horizontal and vertical distribution and its periodic variations. The fourth and last chapter gives the application of the preceding sections to the irregularities and the prediction of the weather; its four sections relate to simple types of isobars and their movements over the globe, followed by complex types of isobars and the practicability of the weather prediction. In a short appendix, pp. 218-23, Marchi gives the elements of the theory of the diurnal variations of the barometer together with the results of Hann's investigations, according to which the second term in the harmonic series is uniform over the whole world and may therefore depend upon something entirely outside the atmosphere, while the first term varies with latitude, temperature, and continentality.

If this popular manual indicates fairly the instruction in meteorology given in the Italian schools, then it must be acknowledged that they are in advance of the high schools of the United States. We see no reason why a popular manual

of this grade should not be introduced into the American schools to the great advantage of our pupils. The advantage would consist, not in the facts and statistics with which their memories are burdened, but in the logical reasoning processes by which the pupil is led to dwell only on the important factors that control the meteorological phenomena.—C. A.

#### PERNTER'S THEORY OF THE RAINBOW.

On page 503 of the MONTHLY WEATHER REVIEW for November, 1904, we published an article by Rev. D. Hammer, S. J., on "Airy's theory of the rainbow." Prof. J. M. Pernter has called the attention of the author to the fact that fig. 2, page 505, might convey the erroneous idea that all the rays when prolonged meet in one point.



FIGS. 1 and 1a.—Pernter's theory of the rainbow.

The exact path of these rays has been worked out very carefully and laboriously by Professor Pernter in his memoir entitled "Ein Versuch, der richtigen Theorie des Regenbogens Eingang in die Mittelschulen zu verschaffen," and the accompanying figs. 1 and 1a from this work, which we publish at Mr. Hammer's suggestion, explain more accurately than that on page 505 the exact paths followed by the rays and the method of their interference so as to form caustics and bands of colors. Professor Pernter has made the whole process of reflection and interference so plain by graphic constructions that his work, which ought to be translated among the classics of science, is commended to high school teachers throughout the country.—C. A.

#### METEOROLOGY IN HAITI.

Under date of February 16, Prof. R. T. Constantine, Professor of Physics in the St. Louis Gonzaga College, Port au Prince, Haiti, informs the Chief of the Weather Bureau that he has organized in that Republic a society which has adopted the name "The Astronomical and Meteorological Society of Port au Prince." This society has been officially approved by the Minister of the Interior, who promises the hearty support of the government. The first business of the society will be to establish meteorological stations at different points in the Republic, in order to determine the climatological elements proper to each of these localities and to the country in general. In the beginning only thermometric stations will be established, where maximum and minimum temperatures, winds, hydrometeors, thunderstorms, and earthquakes will be observed. In order to equip ten climatological stations Professor Constantine hopes that the U. S. Weather Bureau will contribute the necessary apparatus. But as this is quite beyond the legal power of the Chief of Bureau, we may express the hope that the friends of science in America will come to

the help of this new enterprise. The study of climate in its relation to agriculture has been prosecuted for a century very diligently in the Temperate Zone, but very little is known of this important subject with reference to tropical climates.

It may, however, be added that Port au Prince, Haiti, will be established as a regular telegraphic reporting station of the U. S. Weather Bureau during the hurricane season. It will have the complete outfit of a first-class station, and will be installed by a regular Weather Bureau observer, and then left in charge of Professor Constantine.—C. A.

#### WEATHER BUREAU MEN AS INSTRUCTORS.

Mr. James L. Bartlett, Observer, Madison, Wis., on February 8 addressed 200 members of the Wisconsin Agricultural Experiment Association, composed of graduates of the College of Agriculture of the University of Wisconsin. He discussed the value of the Weather Bureau to the farmers and explained the use of the weather map.

Beginning with next fall, Mr. Bartlett's course at the University of Wisconsin will extend throughout the college year, the second semester being devoted more particularly to the study of climatology.

Mr. S. S. Bassler, Local Forecaster at Cincinnati, Ohio, on February 11 delivered an address on "Weather" before the Oxford Farmers' Institute at Oxford, Ohio.

Prof. Henry J. Cox, Chicago, Ill., has begun a series of lectures in that city and vicinity, illustrating with lantern slides the movements of storms, cold waves, and other atmospheric conditions and their effects. He treats in a general way the forecast work of the Weather Bureau. The first lecture was delivered before the Church Men's Club at Englewood, Ill., on February 20; the second was given on February 28 at the regular monthly meeting of the Chicago Academy of Sciences.

The executive committee of the Geographical Society of Chicago, which has decided to publish a bulletin on the teaching of meteorology, has requested Professor Cox to act as chairman of a committee for the preparation of this bulletin.

Mr. W. C. Devereaux, Assistant Observer, Ithaca, N. Y., will give a course in agricultural meteorology and climatology at the Agricultural College of Cornell University during the last half of the present school year. The course includes one lecture and two quiz and laboratory periods each week, and the following lectures will be given during the term:

1. Temperature. Radiant energy; effect of different rays upon vegetation; importance of diffused daylight for vegetation; reflected heat; terrestrial radiation; soil temperatures; sensible temperatures.
2. Precipitation. Causes of unequal distribution and effects of; data to be considered; capacity of soils; plant requirements; water for irrigation; and the value of reliable observations.
3. Floods. Classes; river basins; sources of flood water; rise, crest, velocity, and methods of predicting stages.
4. Weather. Defined; changes produced by passage of cyclones and anticyclones; hurricanes; cold waves.
5. Weather maps. Method of preparing daily map; practise in preparing.
6. Forecasting the weather. Method employed; meaning of terms used; results obtained.
7. Practise forecasting. Practise forecasts made from weather maps and compared with resulting conditions; special types considered.
8. Long-range forecasts. Defined; relative effect upon the weather of different factors; results.
9. Climate. Defined; effects of latitude, altitude, oceans, forests, etc.
10. Climate and plants. Distribution and development of plants as depending on climate.
11. Climate and man. Effects of climate on the human race.
12. Meteorology in the schools. The extent to which meteorology is taught in the schools to-day and how it can be increased.
13. The meteorological services of the world. A history of the different services and their importance.